Periscope.

The Course of Fibres in the Posterior Horn of the Human Spinal Cord, and the Relation of the Lesion of Tabes to it. HEINRICH LISSAUER. *Arch. für Psych.*, xvii., 377.

1. The normal posterior horn receives two classes of fibres, large and small, which are easily distinguished from each other, though the actual diameter of the fibres varies considerably in each class. The posterior horn can be separated into a number of regions : first, the region of the entrance of the posterior root ; second, the region of the substantia gelatinosa Rolandi ; and third, the region of the substantia spongiosa. (1) The region of entrance of the post. root is seen to contain bundles of nerve fibres running vertically through the cord, parallel to bundles in the posterior and lateral columns, and forming a sort of annectant column between these two, since it is not separated from them by any special septa. It is distinguishable from these columns, however, by the fact that it contains fine fibres only. It is traversed by the post. nerve roots. This column is named the peripheral zone of the post. horn. If any large fibres are found in this zone, they are on its edges, and belong really to other columns. The bundles of fibres in this zone are often separated from one another by septa of basis-substance, which is present in large amount in this region. They are also separated by the post. nerve roots, though in some specimens the bundles of fine fibres are seen to cross or wind around the nerve roots in their upward course. In the usual description of the post. nerve root, two divisions of fibres are mentioned, one of which enters directly the post. horn, the other turns toward the median line, and enters the post. lateral column. There is really a third division, which is made up exclusively of fine fibres. These turn upward immediately after entering the cord, and pass into this peripheral zone, which is thus seen to have its origin in the posterior nerve root. The fibres which make up this peripheral zone do not, however, pursue a long course upward. This is proven by the fact that the zone does not become larger as it advances toward the brain. The fibres which make it up terminate in the gelatinous substance,

but always at a level higher than that of their entrance. The peripheral zone is, therefore, formed by small fibres of the posterior nerve root, on their way up to the gelatinous substance.

2. The region of the gelatinous substance shows a peculiar spongy structure on its posterior edge, which must be distinguished from the other part. This consists of a confused mass of fine fibres passing in all directions, and mingled together so as to form a thick mesh. Into this mesh, three sets of fibres are seen to enter : (*a*) from the peripheral zone, (*b*) from the posterior nerve roots, (*c*) from the posterior column. From this mesh many fibres pass forward into the deeper gelatinous substance. What the relation is between the fibres entering and leaving this region is doubtful. It is possible that here the fine fibres terminate ; if so, this region equals the central gray matter in importance. It is possible that the fibres simply traverse this region to end elsewhere. It is also possible that an independent set of fibres exists here, not related directly to the roots ; a hypothesis which seems to be supported by the fact that in tabes there is here a region unaffected by the degeneration of the posterior root zone. The typical gelatinous substance lies in front of this spongy zone. It is made up of a coarse mesh of fibres, both large and small. The large fibres pass in bundles from the post. roots, either directly forward or in large curves to the deep region of the posterior horn. The small fibres, on the contrary, come chiefly from the spongy zone ; a few, however, curve through the posterior root zone, and thus reach the gelatinous substance. The majority of the fibres in the gelatinous substance pass directly forward horizontally, but some pass in other directions, so that the mesh is very thick. Fibres may often be seen passing from the gelatinous substance into the lateral column ; but the fact that these never degenerate in tabes proves that they are not continuous with the post. nerve roots. Compact longitudinal bundles in the gelatinous substance, when found, are simply aberrant bundles of the lateral or posterior columns.

3. The region of the substantia spongiosa lies between the gelatinous substance and the posterior gray horn. Its basis-substance is a mesh of very fine fibres. It is to be noticed that in this can be distinguished a posterior and an anterior division, separated by fine fibres, which pass longitudinally through the region. Into this region pass many fibres from the posterior roots, which turn upward in their course, and are known as the longitudinal bundles of the posterior horn. Bundles of fibres are also seen to pass forward and into the anterior horn of the cord, and into the anterior commissure. Lastly, in the basal part of the posterior horn, in a fine mesh of fibres, are seen the bundles entering from the posterior lateral column and from the lateral column, which pass toward the ant. and post. commissures.

These details of structure have been discovered by the aid of Weigert's new method of staining. The same method was applied to the study of tabetic cords. It was found that the peripheral zone

of fine fibres was always sclerotic in tabes, though not always among the first portions affected. The zone was shrunken, and its outline was very definitely distinguished from the lateral column. In some cases in an early stage it was distinguishable from the posterior column, being the part chiefly affected. This seems to warrant the conclusion of the author that it is to be regarded as a distinct column. Any constant relation between its sclerosis and the appearance of any definite symptom was not determined.

Attention is also called to the changes in the substantia spongiosa in tabes. It was found that in tabes many of the finer fibres in the meshwork of the posterior part of this region were degenerated, so as not to be visible by Weigert's stain. This result, however, is not new, since it is well known that this part of the posterior horn and its plexus of fibres are affected in this disease. The large root fibres, which pass directly into the horn, are affected late in tabes, and the progress of their sclerosis is slow. The root fibres, which curve through the posterior lateral column, degenerate at the same time as this column, and they are affected earlier than the meshwork of the substantia spongiosa, into which they pass.

Changes in the vesicular column of Clarke are constant, and appear early in the disease. The cells are not affected, but the plexus of fine fibres in which they lie show marked evidence of degeneration, and finally disappear. The fibres entering the column from the posterior roots also degenerate.

The author emphasizes the fact that the lesion in tabes is not simply a sclerosis of the posterior root zone, but that it is a complex lesion, involving in different degrees the large and the small fibres of the posterior roots, and also the plexus in the posterior horn and in the Clarke column. It is too early to assign to each of these its rôle in the production of the symptoms of tabes, but such a careful study of pathological facts as is here presented cannot but lead in the end to this result. M. A. S.

The Origin of the Corpus Callosum : A Contribution upon the Cerebral Commissures of the Vertebrata. By HENRY F. OSBORN, Ph. D., Professor of Comparative Anatomy, Princeton College. *Morphologische Jahrbuch*, July, 1886.

The value of this very complete article is attested by the fact of its publication in English in the chief German periodical of comparative anatomy. The author has had at his disposal the extensive material in the laboratories of Gudden and Kupffer in Munich, and his conclusions are drawn from a wide range of observations. After a critical review of existing views as to the origin of the cerebral commissures, and a clear statement of the facts observed in the large number of brains investigated, he reaches the following conclusions :—(1) In the brain of fishes, the olfactory lobes are united with each other by an olfactory commissure, which probably is homologous with that part of the pars olfactoria in the mammalia which supplies the olfactory lobes. Within this

are the inner olfactory tracts, which arise from nuclei of uncertain position, and crossing each other in front of the olfactory commissure, enter the olfactory nerves, forming an internal and posterior root. The cerebral lobes are united by one or more bundles of fibres, which constitute the commissura inter lobularis. (2) In the amphibians, the cerebral commissures lie behind the foramen of Monro. They consist of an upper and a lower bundle. The former is much the larger. It passes upwards and forwards behind and above the foramen, and gives the commissural supply of the dorso-medial portion of the hemispheres. It is the corpus callosum. The lower bundle is the anterior commissure. Its main division is the pars olfactoria, which supplies a part of the brain stem, the ventro-lateral portion of the hemispheres, and probably the olfactory lobes. Its lesser division, supplying the lower posterior portion of the hemispheres, is the pars temporalis. The inner olfactory tracts arise near the anterior commissure, cross each other, and pass into the olfactory lobes. (3) In the reptiles, the cerebral commissures lie below and slightly in front of the foramina of Monro. The larger upper bundle ascends in front of the foramen, and divides. The anterior division, or corpus callosum, supplies the whole of the inner mantle. The small posterior division supplies the inner fold of the hemispheres, and represents a portion of the fornix. The lower bundle is the anterior commissure. It consists of an upper tract, the pars olfactoria, the distribution of which is doubtful, and of a lower tract, the pars temporalis, which is distributed as in the mammalia. In connection with the corpus callosum is a bundle representing a portion of the fornix. (4) The position of the cerebral commissures in the birds is similar to that in the reptiles. The upper bundle is very small. It divides and is distributed as in the reptiles, but the division representing the corpus callosum is much smaller than that representing the fornix. The anterior commissure consists principally of the pars temporalis, the pars olfactoria being reduced or wanting. The corpus callosum is larger than the anterior commissure in the amphibia and reptiles, but in birds it is much smaller. These proportions are in relation to the thickness of the inner mantle. In the birds, accordingly, where the inner mantle has suffered the greatest reduction, the corpus callosum is a mere rudiment. In the other groups described, it is far from rudimentary. In comparison with what we observe even in the lowest mammals, the size of the cerebral commissures is diminutive in proportion to that of the hemispheres. M. A. S.

Descending Degeneration in the Brain and Cord Experimentally Produced, and its Relation to the Doctrine of Localization of Functions. L. BIANCHI. *Neurol. Centralbl.*, No. 17.

Following the method of Gudden, Bianchi has extirpated the motor zone of the cortex in new-born dogs, and has observed the

results after a lapse of one to two years. The symptoms produced in all cases were permanent changes in power in the limbs of the side opposite to the hemisphere operated on ; temporary disturbance of sight ; little or no alteration of tactile sensibility ; and no particular change in the psychical functions. The disturbance of motion did not consist in ataxia, but in a true paresis, a loss of muscular power, with some contracture. The loss of voluntary motion was total, and automatic movements were also impaired. The disturbance of sight was of the character of hemianopsia, and was very much more marked just after the operation than later. It could not be determined whether it was a total or a psychical blindness. Microscopic examination of the brains showed the orginal lesion to have been limited to the gray cortical layers. A descending degenerative atrophy was traceable through the centrum semiovale, the internal capsule, the crus, the pons, and the medulla in the well-known course of the motor tract ; and in the opposite lateral column of the cord in the pyramidal tract, and in one case in the column of Türck as well. The special interest of the experiments lies in the fact that a noticeable atrophy was found in the corpus callosum, where it reached the middle line ; and also in the caudate and lenticular nuclei. These latter showed an increase of nuclei, and of neuroglia. The optic thalamus was not changed in size, but was rounder, probably because of the dilatation of the lateral ventricle caused by the atrophy of the caudate nucleus.

The conclusions reached from the experiments are as follows :

1. Since the fibres beneath the cortex, were not injured by the operation, the degeneration of the tract must have been due to the cortical lesion.

2. Since the degeneration started in the cortex, the cortex and the affected fibres must be considered as a functional unit.

3. The corpus striatum is intimately connected by a system of fibres with the motor zone, a fact urged by Meynert, but denied by Wernicke.

4. If the pramidal tract is motor, its centre of origin must also be motor. The results of the experiments opposed the theories of Munk and Schiff, that the motor cortex is an area of muscular sense, since there was no true ataxia.

5. The motor area of the cortex is not only a motor centre for the highest evolved movements, but is also the source whence all motions issue, since walking, running, jumping, are all imperfectly performed after its extirpation.

6. Dogs whose motor cortex only is removed, preserve the same instincts, the same spirit as normal dogs ; are intelligent, faithful, playful ; are well nourished ; and can propagate their species, but their puppies are epileptic.

7. The recovery of automàtic movements in some degree is not to be ascribed to the action of the corpus striatum, since this is atrophic. It is rather to be considered as a function of other portions of the cortex, which thus take up and carry out the action

of the deficient part, but in an imperfect manner. The portion to which the author asigns this vicarious work, is the uninjured motor cortex of the opposite hemisphere.   M. A. S.

The Degeneration Following the Partial and Total Extirpation of the Cerebellum.
Gaz. degli Ospitali, Aug. 22, 1886, No. 67.—In this paper, which was presented to the *Societa Medico-fisica* of Florence by Dr. VITTORIA MARCHI, the following results were announced :

1st. After total extirpation of the cerebellum, there occurs a diffuse sclerosis, especially of the gray substance of the pons Varolii which surrounds the pyramid, and of the inferior olive ; of all the cerebellar pedunculi, including the direct cerebellar tract of Flechsig, without any lesions of the nuclei of origin of the cranial nerves.

2d. After extirpation of half of the cerebellum, there is degeneration of the elements mentioned above, especially in the part corresponding to the lesion, but also in parts of the other side. It was interesting to note that many of the degenerated fibres of the superior cerebellar peduncle, instead of crossing entirely over to the opposite side, took a direct course to the nucleus of Stilling of the same side without decussating.

3d. Following the extirpation of the middle lobe there took place a degeneration of the greater part of those fibres which constitute the direct cerebellar tract of Flechsig, and the small ventral fasciculus of the pons described by Löwenthal, which, in the restiform body, is associated with fasciculus of Flechsig in extending itself along the external portion of the lateral columns of the medulla.   A few of the arciform fibres were degenerated, and many of those pertaining to the inferior convolutions of Reil, and many fibres of the pyramidal tracts.

4th. It was observed, after total or partial extirpation of the cerebellum, that the cranial nerves were subject to the degenerative process.   More especially the third, fifth, sixth, seventh, eighth, tenth, and twelfth.   The nuclei of origin and the fibres emanating from them seemed exempt from degeneration, the fibres not showing degeneration till their emergence in the vicinity of the pons.

The experiments from which these conclusions were deduced were performed upon six dogs and two monkeys.   Of the three dogs in which the cerebellum was totally extirpated, one lived eight months after the operation, the second a year, and the third about two years.   In the three cases of partial extirpation, the two dogs lived two months, and the monkey eleven months.

                                                            G. P.